Test Report

State of New Mexico Ballot on Demand Testing Program

Test Report Rev 02

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Prepared for:

Client Name	*Automated Election Services*
Governing Organization	*State of New Mexico*

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Accredited by the National Institute of Standards and
Technology (NIST) National Voluntary Lab Accreditation
Program (NVLAP), and accredited by the Election
Assistance Commission (EAC) for VSTL status.

Revision History

Release	Author	Revisions
Rev 01	M. Santos	Initial Release
Rev 02	M. Santos	Update to requirement 4.2 review

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The tests referenced in this document were performed in a controlled environment using specific systems and data sets, and results are related to the specific items tested. Actual results in other environments may vary.

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1 Introduction

SLI Global Solutions is submitting this report as a summary of the testing efforts and requirements review for the State of New Mexico Ballot on Demand testing program.

Within the scope of this project, *Automated Election Services* (AES) was requested to provide an implementation of their system as declared to the State of New Mexico. SLI also requested AES provide any available information with regard to the implemented system, SLI reviewed what documentation was provided.

As directed by the State of New Mexico, the primary focus of this project was the evaluation of the requirement set, as provided by the State, against the submitted Ballot on Demand systems. The review and testing was performed at SLI's Denver, Colorado facility.

SLI is a full service third party testing facility, founded in May 1996, from a software test-consulting firm. The specific system testing services offered include:

- Test Planning and Test Management
- eBusiness, Client-Server and Stand-alone Application Functional, Compatibility and Regression Testing
- eBusiness and Client-Server Load and Performance Testing
- Automated Regression Test Development, Consulting, Scripting and Execution
- Complex, Integrated Test Solutions and Automated Test Harnesses
- Independent Verification and Validation
- EAC approved and NIST NVLAP accredited Voting System Test Laboratory

1.1 References

1. Ballot on Demand Standards for State of New Mexico
2. SLI Quality System Manual, Revision Rev. 1.12, prepared by SLI, dated February 24, 2011.

2 AES System Overview

2.1 Documentation Provided

The list below details the documentation set provided by AES for review and use by SLI in setup of the system and creation of tests to be run.

- o No documentation

2.2 Declared System to be Reviewed

AES provided the applications and hardware listed below, as the components of their Ballot on Demand system.

- o Autovote System (Absentee System) Autovote version 7.1.1
- o Autovote System (Voting Convenience Center) Autovote version 7.2.1.
- o HP LaserJet 5200tn (Q7545A) printer

3 Testing Methodology Employed

3.1 Test Campaign

In a test campaign, SLI expects a production level system delivered for testing. This encompasses any and all hardware, consumables and applications; a declaration of the functionality supported by the system; and documentation of how the system is employed by a jurisdiction.

A certification test campaign is broken out into 5 main phases, each phase building upon the preceding phases.

The first phase deals with receipt of the system's components and applicable documentation. The manufacturer is requested to provide training on the various aspects of the system under test. Additionally, the first phase encompasses reviewing the documentation provided. At the end of the first phase, with a more in-depth understanding of the system based on the documentation review, as well as provided training, test creation is begun that details how the declared requirement set will be verified against with regard to the system under test.

The second phase deals with the creation of the individual test modules that will execute each piece of functionality within the system under test.

The third phase deals with the correctness of each module. This phase can be iterative until all modules are determined to be correct in implementation.

The fourth phase deals with the formal execution of each test.

The fifth phase deals with creation, submission and acceptance of the certification test report.

4   Test Background

4.1   Review

For section 3, "Hardware Requirements", analysis was conducted via a documentation review for each component within the system. AES supplied third party documentation from each vendor, which contained the pertinent information to make determinations as to the components capability of meeting each requirement.

4.2   Functional Testing

SLI's tests were customized for the AES ballot on demand system and conducted for the functional testing.

Simulations of General and Primary election cycles were conducted, utilizing elections and related ballot styles, as provided by the State of New Mexico. These simulations were conducted to demonstrate a beginning-to-end business use case process for the AES ballot on demand system. Areas addressed by the requirements include appropriate printout representation of ballots, tracking of voter ballots in early and absentee voting scenarios, as well as appropriate auditing and reporting capabilities.

5 Requirements Analysis

5.1 Requirements Reviewed

This section reviews how the system under test performed in relation to the requirement set provided by the State of New Mexico.

1 Functional Capabilities

All on demand ballot generation systems shall provide the general capabilities for ballot preparation and shall be capable of:

1.1 enabling the automatic formatting of ballots in accordance with the requirements of the New Mexico Election Code, as amended from time to time, for offices, candidates and questions qualified to be placed on the ballot for each political subdivision and election district;

Review:
Using Primary election style and General election style ballots as supplied by the State of New Mexico, it was verified that the AES ballot on demand system is capable of printing a ballot automatically formatted with the appropriate offices, candidates and questions qualified to be placed on the ballot for each political subdivision and election district, as well as with any pertinent overlays.

1.2 supporting the maximum number of potentially active voting positions;

Review:
Using a ballot style representative of a maximum active voting position layout, as supplied by the State of New Mexico, it was verified that the AES ballot on demand system is capable of printing a ballot supporting the maximum active voting positions.

1.3 generating ballots for a primary election that segregate the choices in partisan contests by party affiliation;

Review:
Using a Primary election style ballot, as supplied by the State of New Mexico, it was verified that the AES ballot on demand system is capable of printing ballots for a primary election that segregates the choices in party contests, by party affiliation.

1.4 generating ballots that contain identifying codes or marks uniquely associated with each format;

Review:
Printing of different ballot styles within a jurisdiction, for both primary and general elections, it was verified that the AES ballot on demand system is capable of generating ballots that contain identifying codes or marks that are uniquely associated with each format.

1.5 ensuring that voting response fields properly align with the specific candidate names and/or questions printed on the ballot;

Review:
Printing single ballots and batches of ballots, of both primary and general elections, it was verified that the AES ballot on demand system generates voting response fields properly aligned with the specific candidate names and/or questions printed on the ballot.

1.6 generating ballots which can be tabulated by all certified voting systems in the state;

Review:
Using ballots supplied by the State of New Mexico, of both primary and general elections, it was verified that the AES ballot on demand system is able to produce ballots which are capable of being tabulated by the certified voting systems in the state.

1.7 generating a ballot for an individual voter based on voter registration data provided by state or county;

Review:
Using the voter registration data set provided by the State of New Mexico, it was verified that the AES ballot on demand system is able to generate an individual voter's ballot, as needed.

1.8 functionality in both absentee and early voting environments;

Review:
Using primary and general election style ballots, as provided by the State of New Mexico, the functionality was verified that the AES ballot on demand system is functional in both absentee and early voting environments. Note that AES employs two applications one for Absentee voting and one for Early voting, within their Autovote system. Elections exercised included an absentee primary (in Autovote Absentee System), and an early voting general (in Autovote Voting Convenience Center). This allowed the system to produce ballots, as well as detailed reporting for each election. Due to the manner in which the system was instantiated for an election, we were not able to configure either an absentee general or early voting primary election on the respective applications within the Autovote system.

1.9 providing absentee ballot tracking ability;

Review:
It was verified, that the AES ballot on demand system, provides adequate absentee ballot tracking capabilities.

1.10 uniform allocation of space and fonts used for each office, candidate and question such that the voter perceives no active voting position to be preferred to any other;

Review:
Using ballots supplied by the State of New Mexico, it was verified that the AES ballot on demand system is able to produce ballots, as created by voting systems certified by the State, with uniform allocation of space and fonts, such that no active voting position is perceived to be preferential to any other position.

1.11 rendering the ballot in any of the languages required by the Voting Rights Act of 1965, as amended;

Review:
Using ballots supplied by the State of New Mexico, it was verified that the AES ballot on demand system is able to render the ballot in any language, as prescribed by the State (English and Spanish).

1.12 conformity with voting system vendor specifications for type of paper stock, weight, size, shape, size, font and location of voting positions used to record votes, folding, bleed through, and ink for printing.

Review:
Using ballots supplied by the State of New Mexico, it was verified that the AES ballot on demand system is able to utilize paper and ink type that conforms to voting systems, certified by the State, prescribed requirements, such that ballots are appropriately produced.

1.13 interfacing with the statewide voter file for the exchange of data.

Review:
Using the voter registration data supplied by the State, the AES ballot on demand system was verified to be capable of interfacing with the statewide voter file, for the exchange of data.

2 Security Capabilities

All on demand ballot generation systems shall provide the security capabilities for ballot preparation and shall be capable of:

2.1 providing a full audit trail of individual voter activity;

Review:
It was verified that the AES ballot on demand system is capable of adequately providing full audit trails for individual voter activities.

2.2 providing full ballot production audit logs for all activity including, but not limited to, absentee by mail, in person absentee, early voting, provisional voting and spoiling ballots;

Review:
It was verified that the AES ballot on demand system is capable of adequately providing full ballot production audit logs for required activities, as noted in the requirement.

2.3 creation and preservation of an audit trail of every ballot issued during a period of interrupted communication in the event of loss of network connectivity;

Review:
It was verified that the AES ballot on demand system is capable of creation and preservation of an audit trail of every ballot issued from its system during periods of interrupted communications due to the loss of network connectivity.

2.4 suitable security passwords at user, administrator and management levels;

Review:
The AES ballot on demand system provides suitable password security policies such that the system is secure to each role level implemented, though there are only two roles provided, user and administrator. No management type role is provided.

2.5 preventing the modification of ballot formatting by polling place users.

Review:
It was verified that the AES ballot on demand system provides suitable security, by implementation of appropriate password policy enforcement and role enforcement, that no polling place user is able to modify a ballots format.

2.6 retaining full functionality and capability of printing ballots during a period of interrupted communication in the event of a loss of network connectivity

Review:
It was verified that the AES ballot on demand system does retain full functionality and capability of printing ballots during periods of interrupted communications, such as the event of a loss of network connectivity, by removing network connectivity to the system.

3 Hardware Requirements

All on demand ballot generation systems shall provide the hardware requirements, as follows:

3.1 must be networkable and scalable for multiuser environments;

Review:
The AES ballot on demand hardware complies with this requirement.
The HP LaserJet 5200tn (Q7545A) printer has four possible network printer configurations:

1. Connect directly to the network (direct mode or peer-to-peer printing).
2. Connect directly to the network and a shared print queue is configured on a network file/print server (client-server printing).
3. Connect directly to a PC that acts as a print server, allowing the printer to be shared to PC clients on the network.
4. PC clients connect to a device that has already been set up on the network, or connect to a print queue that is shared from either another PC client or file/print server. Complies with this requirement.

- HP LaserJet 5200tn (Q7545A) printer
  - **Connectivity, standard:** 1 IEEE-1284 parallel; 1 USB; 1 Fast Ethernet 10/100; 1 EIO
  - **Connectivity, optional:** HP Jetdirect 175x Fast Ethernet Print Server (J6035G), HP Jetdirect en3700 Fast Ethernet Print Server (J7942G), HP Jetdirect 620n Fast Ethernet Print Server (J7934G), HP Jetdirect 625n Gigabit Ethernet Print Server (J7960G), HP Jetdirect 635n IPv6/IPsec Print Server (J7961G), HP Jetdirect ew2400 802.11g Wireless Print Server (J7951G)

3.2 function without degradation in capabilities after transit to and from the place of use;

Review:
Transit specifications on the HP LaserJet 5200tn (Q7545A) printer not provided or found.

3.3 function without degradation in capabilities after storage between elections;

Review:

The AES ballot on demand hardware complies with this requirement. Printing and paper storage environment should be at or near room temperature, and not too dry or too humid.

- HP LaserJet 5200tn (Q7545A) printer
  - Printer cartridge black: 12,000 pages ~6 months in accordance with ISO/IEC 19752
  - Environmental Conditions
    - Temperature (printer and print cartridge):
      - Printing: 15° to 32.5°C (59° to 89°F)
      - Storage/standby: -20° to 40°C (-4° to 104°F)
    - Relative humidity:
      - Printing: 10% to 80%
      - Storage/standby: 10% to 90%
    - Storage: The paper storage environment should be properly maintained to ensure optimum printer performance. The required condition is 20° to 24°C (68° to 75°F), with a relative humidity of 45% to 55%.
    - Storage Temperature: 32 to 104 degrees F (0 to 40 degrees C)

3.4 function in the natural environment, including variations in temperature, humidity and atmospheric pressure;

Review:
The AES ballot on demand hardware complies with this requirement.
- HP LaserJet 5200tn (Q7545A) printer
  - Operating Temperature:
    - 50 to 90 degrees F (10 t0 32 degrees C)
  - Storage Temperature:
    - 32 to 104 degrees F (0 to 40 degrees C)
  - Relative Humidity Conditions:
    - 20 to 80 %, non-condensing

3.5 function in induced environment, including proper and improper operation and handling of the system and its components during the election process;

Review:
The AES ballot on demand hardware complies with this requirement
- HP LaserJet 5200tn (Q7545A) printer
    - Operating Temperature:
        - 50 to 90 degrees F (10 t0 32 degrees C)
    - Storage Temperature:
        - 32 to 104 degrees F (0 to 40 degrees C)
    - Relative Humidity Conditions:
        - 20 to 80 %, non-condensing

3.6 contain prominent instructions as to any special requirements;

Review:
The AES ballot on demand hardware complies with this requirement
LaserJet 5200tn (Q7545A) printer provides step-by-step instructions, troubleshooting the printer, etc.

3.7 have no restrictions on space allowed for installation, except that the arrangement of the system shall not impede the performance of duties by election workers, the orderly flow of voters through the polling place or the ability of the voter to vote in private;

Review:
This requirement will be determined by the allowed space for installation per location and the physical dimensions of the HP LaserJet 5200tn (Q7545A) printer

- Dimensions:
    - Height 404 mm (15.9 in)
    - Depth 535 mm (21 in)
    - Width 490 mm (19.3 in)
    - Weight 30.2 kg (66.5 lb)

3.8 operate with the electrical supply ordinarily found in polling places (Nominal 120 Vac/60Hz/1 phase).

Review:
The AES ballot on demand hardware complies with this requirement.
- HP LaserJet 5200tn (Q7545A) printer
  - Power Specifications: (AC110 – 127V, 50/60Hz (+/- 2 Hz).
  - Rated short-term current: 10.0 Amps

4 Software Requirements

All on demand ballot generation systems shall provide software requirements as follows:

4.1 must be capable of exporting voter data and voter activity status data to state/county voter registration systems;

Review:
It was verified that the AES ballot on demand system is capable of exporting voter data, as required, to state/county voter registration systems.

4.2 must be capable of generating all required absentee and early voting signature rosters in state approved format;

Note that 4.2, was provided the additional clarification by the State:

NMSA 1-12-7.3: Signature rosters and checklists of voters; contents.
A. The signature roster and checklist of voters for any precinct shall contain for each voter, as
shown in the county register, the voter's:
(1) name;
(2) gender;
(3) place of residence;
(4) year of birth;
(5) party affiliation, if any; and
(6) precinct of residence.
B. In addition, the names on each signature roster and checklist of voters shall be numbered

consecutively beginning with the number "1".
C. On each page of each signature roster and each checklist of voters
there shall be printed the page number and the date and name of the
election for which they are to be used.

Review:
The AES ballot on demand system does create absentee and early voting
signature rosters, though the rosters do not contain NMSA 1-12-7.3 "B,
page numbers". The Absentee System application does contain the
voter's gender, as per NMSA 1-12-7.3. "A(2) gender". The Voting
Convenience Center does not contain NMSA 1-12-7.3. "A(2) gender".

4.3 must generate daily and to-date activity reports based on user defined
criteria

Review:
It was verified that the AES ballot on demand system implements
adequate capability for generating both daily and to-date type reports,
based on user defined criteria.

4.4 must have both single transaction and batch transaction absentee
production capability.

Review:
It was verified that the AES ballot on demand system is capable of
processing ballot requests in both single transaction and batch
transaction modes.

5 Usability Requirements

All on demand ballot generation systems shall provide usability requirements as
follows:

5.1 Capable of being operated by computer users familiar with a graphical
user interface.

Review:
It was verified that a computer user with basic familiarity with graphical
user interfaces are capable of operating the AES ballot on demand
system.

6 Test Results Summary

The AES system has shown the capabilities to fulfill ballot on demand functionality in creating single ballot transactions as well as batch transactions. The system is able to create reports and audit logs on activity as listed in the requirement set. The system has also shown the capability to interact with voter registration systems.

For requirement 1.8, due to the manner that the system is instantiated for an election, we were not able to configure either an absentee general or early voting primary election on the respective applications within the Autovote system.

For requirement 2.4, the AES ballot on demand system provides suitable password security policies such that the system is secure to each role level implemented, though there are only two roles provided, user and administrator. No management type role is provided.

For requirement 3.2, Transit specifications on the HP LaserJet 5200tn (Q7545A) printer were not provided or able to be found.

For requirement 4.2, The AES ballot on demand system does create absentee and early voting signature rosters, though the rosters do not contain NMSA 1-12-7.3 "B, page numbers". The Absentee System application does contain the voter's gender, as per NMSA 1-12-7.3. "A(2) gender". The Voting Convenience Center does not contain NMSA 1-12-7.3. "A(2) gender".

End of Test Report